Remarks

These remarks are responsive to the Office Action dated December 14, 2005. Applicant would like to thank the Examiner for carefully reviewing the application. In the application claims 1-4, 6-7, 9-22, 24-25, and 27-34 are pending and claims 5, 8, 23, and 26 have been cancelled.

Before discussing the Office action in detail, Applicants believe that it may be useful to review some background information. The present application is directed to a catalyst deterioration detecting apparatus for an internal combustion engine. Specifically, the inventors herein have recognized that oxidants may be stored in different portions of the catalyst or catalysts depending on catalyst and exhaust system configuration.

As described in the specification, the inventors herein have recognized that it is possible to not only control stored oxygen in a catalyst by controlling air-fuel ratio, but also to detect an oxygen storage capacity of the catalyst based on the amount of oxygen stored in the catalyst, and then determine degradation of the catalyst based on the detected oxygen storage capacity.

Specifically, claim 1 now recites:

> A catalyst deterioration detecting apparatus for an internal combustion engine, comprising:
> a controller that:
> detects an amount of oxygen stored in an upstream catalyst and a separate amount of oxygen stored in a downstream catalyst;
> controls the amount of stored oxygen in the upstream catalyst by controlling an air-fuel ratio of gasses that flow into the catalyst based on said detected amounts;
> detects an oxygen storage capacity of the upstream catalyst based on said detected amount of stored oxygen in the upstream catalyst; and
> determines degradation of said upstream catalyst based on said detected oxygen storage capacity of the upstream catalyst.

In this way, it is possible to reduce exhaust emissions and accurately discriminate catalyst degradation of the upstream catalyst.

Rejections under 35 USC § 102

The Office action has rejected claims 1, 4, 7, 10-11, 14-15, and 25 under 35 U.S.C. § 102(e) as being anticipated by Takahashi et al. (U.S. 6,216,450). Applicants respectfully traverse these rejections. Nevertheless, Applicants have amended claims 1, 4, 7, 11, 15, and 25 to facilitate prosecution.

Regarding Claims 1 and 11

First, amended claim 1 now recites a controller that detects an amount of oxygen stored in an upstream catalyst and a separate amount of oxygen stored in a downstream catalyst. The Office asserts on page 2 that:

> Takahashi discloses a catalyst deterioration detecting apparatus for an internal combustion engine, comprising: a controller (11) that: detects an amount of oxygen stored in an upstream catalyst (e.g. 6) and an amount of oxygen stored in a downstream catalyst (e.g. 7);

Applicants have examined Takahashi et al. and can find no mention of a controller that "detects a separate amount of oxygen stored in the downstream catalyst". Rather, the columns and lines cited in the Office action show an oxygen storage basic B_FORS "for the three-way catalyst 6" and mentions capacities of catalysts 6 and 7, but has no mention of an amount of oxygen stored in catalyst 7. This argument further applies to claim 11.

Furthermore, the controller described by at least claim 1 is configured to detect an oxygen storage capacity of the upstream catalyst based on a separate amount of oxygen stored in

an upstream catalyst, whereas Takahashi makes no mention of determining oxygen storage capacity of the upstream catalyst based on the value B_FORS. Rather, Takahashi diagnoses the oxygen storage capacity of catalysts 6 and 7 based on a peak air-fuel value detected, as noted in Col. 12, lines 30-38, cited below:

> The second embodiment is arranged to execute the rich-spike treatment twice continuously and to diagnose the oxygen storage capacity of the three-way catalyst 6 and the NOx storage type three-way catalyst 7 on the basis of the peak value A/F1 detected during the second rich-spike treatment.

Specifically, Takahashi et al. determines first whether the NOx storage capacity is deteriorated in response to an air/fuel sensor located downstream of both catalysts before deciding whether the oxygen storage capacity is deteriorated.

> When the control unit 11 decides that the NOx storage capacity is not deteriorated during the first rich-spike treatment, the control unit 11 also decides that the oxygen storage capacity is not deteriorated. When the peak value A/F1 detected during the second rich-spike treatment is greater than the threshold, the control unit 11 decides that the oxygen storage capacity of each of the three-way catalyst 6 and the NOx storage type three-way catalyst 7 is deteriorated.

Thus, claim 1 requires detecting an oxygen storage capacity of the upstream catalyst based on a detected amount of stored oxygen in the upstream catalyst, whereas Takahashi et al. discloses diagnosing the oxygen and NOx storage capacity based on an air/fuel peak value.

Applicants therefore request that the rejection of claims 1 and 11 be withdrawn.

Regarding Claims 4, 7, 15, and 25

Applicants have amended claim 4 to include the limitations of claim 5, which was allowed by the Office action. As such, claim 4 should be allowed as currently amended.

Applicants have also amended claim 7 to include the limitations of claim 8, which was allowed by the Office action. As such, claim 7 should be allowed as currently amended.

Applicants have also amended claim 15 to include the limitations of claim 23, which was allowed by the Office action. As such, claim 15 should be allowed as currently amended.

Applicants have also amended claim 25 to include the limitations of claim 26, which was allowed by the Office action. As such, claim 25 should be allowed as currently amended.

Based on the foregoing comments, the above-identified application is believed to be in condition for allowance, and such allowance is courteously solicited. If any further amendment is necessary to advance prosecution and place this case in allowable condition, the Examiner is respectfully requested to contact the undersigned by fax or telephone at the number listed below.

Please charge any cost incurred in the filing of this Amendment, along with any other costs, to Deposit Account No.06-1510. If there are insufficient funds in this account, please charge the fees to Deposit Account No. 06-1505.

CERTIFICATE OF FACSIMILE

I hereby certify that this correspondence is being sent via facsimile to the U.S. Patent and Trademark Office at (571) 273-8300 on March 14, 2006.

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Respectfully submitted,

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